San Luis Drainage Feature Re-evaluation

Drainage Service Options

May 2002

Introduction

As an initial activity of the San Luis Drainage Feature Re-evaluation Project, Reclamation identified and reviewed proven technology and management options for providing drainage service. Reclamation has defined drainage service as an action or set of actions that provide drainage for the San Luis Unit. These options include actions to reduce, treat, reuse, or dispose agricultural drain water. This fact sheet introduces twelve options Reclamation identified in three broad categories: Drainage Water Treatment and Concentration; Drainage Water and Solids Disposal; and Beneficial Uses of Drain Water and Salts. Reclamation determined that each of these twelve drainage service options is proven or demonstrated technology.

The options presented below are discreet methods that will be combined to form complete drainage solutions. Within the Feature Re-evaluation, Reclamation considers on-farm management practices and land retirement as drainage management options designed to control the volume or quantity of drain water, not drainage service options to treat, concentrate, or dispose of drain water. These drainage management options are discussed and evaluated in determining drainage need.

Drainage water treatment and concentration options include technologies and approaches for removing contaminants from the drain water or reducing the volume of drain water for disposal.

Drainage Water Treatment and Concencentration

Desalination is a process that forces drain water through membranes to separate contaminants from the water. This process is also called reverse osmosis. Reverse osmosis results in an outflow stream of very good quality water and a highly concentrated brine waste that requires disposal.

Reclamation re-evaluated three methods of Selenium Treatment. One method uses holding ponds to allow an anaerobic (without oxygen) bacterial process to remove selenium. Selenium would accumulate in a biological sludge on the bottom of the beds, requiring removal and disposal. The second method has similar physical features, but relies on algae instead of bacteria in the treatment ponds to chemically reduce selenium. The resulting biological sludge would require removal and disposal. The third selenium treatment method, chemical treatment, uses the chemical ferrous hydroxide to reduce selenium to elemental form, which then settles to the bottom of the reaction container for removal and disposal.

Integrated Drainage Management is a process of reusing drain water to irrigate salt-tolerant crops. Several rounds of reuse can be used to irrigate a series of increasingly tolerant crops. The process can reduce the initial drain water volume by as much as a factor of ten. Variations of this option are also known as Agroforestry or Integrated Farm

Drainage Management. Integrated drainage management techniques are an important component of on-farm drainage management, however Reclamation is evaluating it here as a larger scale, centralized facility to provide drainage service. (Integrated Farm Drainage Management is discussed in the Drainage Need fact sheet.)

Evaporation Ponds use the energy of the sun and wind to evaporate drain water from large, shallow ponds. Solar ponds are a variation of evaporation ponds specifically designed to make use of a salinity gradient in the pond to generate energy. Traditional ponds simply allow the water to evaporate. Solar evaporators evaporate the water using mist sprayers instead of ponds, so there is no standing water. Evaporation options require ultimate removal of salts, probably to a landfill.

Contact us!

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Drainage Water and Solids Disposal

Reclamation is evaluating four types of disposal options for drain water or solids remaining after treatment processes.

Ocean Outfall would involve use of a pipeline to deliver drain water directly to the Pacific Ocean for offshore discharge.

San Joaquin Delta Outfall would involve the transport of drain water by canal and/or pipeline to the Delta for underwater discharge. This option was the original plan for the partially completed San Luis Drain.

In-Valley Disposition Options could be used for the long-term disposal of salts, brine, or treatment sludge. The design of a landfill determines the kind of materials it can accept.

Deep Well Injection would use a set of wells to inject drain water or brine into deep geologic formations.

Beneficial Uses of Drain Water and Salts

Should practical beneficial uses be identified, this category of options would be combined with another treatment option, and would focus on reusing (selling or giving away) the water and separated constituents (salts and/or selenium) for some commercial use. These options might reduce the overall cost of an alternative.

Developing Alternatives

As described in the fact sheet on alternatives, Reclamation is combining these options into a range of alternatives for evaluation. The alternatives are grouped around disposal themes (Ocean, Delta, Landfill, and Deep Well). Through the Feature Re-evaluation, Reclamation intends to identify the optimal arrangement of options for each disposal theme and then the preferred alternative for providing drainage service.